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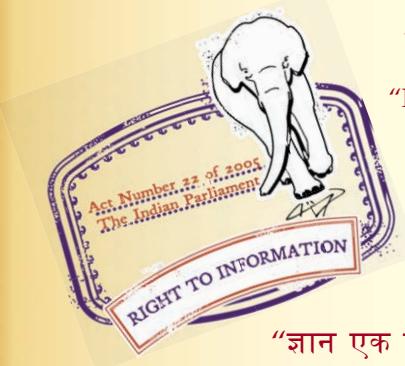
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IS 4223 (1975): Steel Wire for Umbrella Ribs [MTD 4:  
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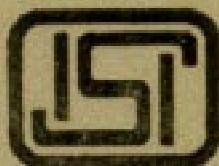
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*Indian Standard*  
SPECIFICATION FOR  
STEEL WIRE FOR UMBRELLA RIBS  
( *First Revision* )

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INDIAN STANDARDS INSTITUTION  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
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*Indian Standard*

SPECIFICATION FOR  
STEEL WIRE FOR UMBRELLA RIBS

*(First Revision)*

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*Indian Standard*

SPECIFICATION FOR  
STEEL WIRE FOR UMBRELLA RIBS

( *First Revision* )

## 0. F O R E W O R D

**0.1** This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 November 1975, after the draft finalized by the Wrought Steel Products Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard was first published in 1967 to guide the umbrella rib manufacturers in selecting proper material. While reviewing this standard in the light of the experience gained, it was decided to modify the sizes and tensile test requirements and also to include the product analysis.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## 1. SCOPE

**1.1** This standard covers the requirements for carbon steel round and flat wire used for umbrella ribs.

**1.1.1** This standard does not cover the requirements for wire for hollow U-shaped ribs.

## 2. TERMINOLOGY

**2.1** For the purpose of this standard, the definitions of various terms shall be as given in IS : 1956-1962†.

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\*Rules for rounding off numerical values (*revised*).

†Glossary of terms relating to iron and steel.

### 3. SUPPLY OF MATERIAL

**3.1** General requirements relating to supply of material shall conform to IS : 1387-1967\*.

### 4. GRADES

**4.1** There shall be three grades of wire designated as Grades 1, 2 and 3.

### 5. MANUFACTURE

**5.1** Steel shall be manufactured by the open-hearth, electric, duplex, basic-oxygen, or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser should be obtained.

### 6. CHEMICAL COMPOSITION

**6.1** The ladle analysis of steel, when analysed in accordance with the appropriate parts of IS : 228† shall be as given below:

Constituent	Percent, Max
Sulphur	0·040
Phosphorus	0·040

**6.2 Product Analysis** — Permissible variation in case of product analysis from the limits specified under **6.1** shall be as follows :

Constituent	Variation Over Specified Limits, Percent, Max
Sulphur	0·005
Phosphorus	0·005

**6.2.1** Chemical analysis shall be carried out for every 10 coils or part thereof and where the wire is cut into lengths, for every 10 bundles or part thereof.

### 7. FREEDOM FROM DEFECTS

**7.1** All finished wires shall be well and cleanly drawn to the dimensions specified. The wire shall be sound; free from splits; surface flaws; rough, jagged and imperfect edges; and other harmful surface defects.

### 8. SIZES

**8.1** The wire shall be supplied to any of the sizes given below :

1·60, 1·65, 1·70, 1·75, 1·80, 1·90, 1·95, 2·00, 2·10, 2·20, 2·30, 2·40, 2·50, 2·65, 2·80, 3·00, 3·15, 3·35, 3·55, 3·75 and 4·00 mm.

\*General requirements for the supply of metallurgical materials (*first revision*).

†Methods of chemical analysis of steel (*second revision*) (being issued in parts).

**8.1.1** These shall be the preferred diameters in case of round wires, and preferred widths in case of flat wires.

## 9. TOLERANCES

**9.1** Tolerances permitted on the diameter, or width in the case of flat wire, shall be  $\pm 0.050$  mm. In case of round wire, the maximum difference between the two readings taken on any two diameters on the cross section shall be 0.050 mm.

## 10. PHYSICAL PROPERTIES

**10.1 Tensile Test** — The tensile strength of wire, when tested in accordance with IS : 1521-1972\*, shall be within the limits given in Table 1.

TABLE 1 TENSILE STRENGTH

SL No.	TYPE OF WIRE	GRADE	SIZE RANGE	TENSILE STRENGTH
(1)	(2)	(3)	(4) mm	(5) N/mm <sup>2</sup> *
i)	Hardened/tempered	1	1.60 to 3.00	1 570 to 1 870
ii)	As-drawn	2	1.60 to 4.00	1 270 to 1 570
iii)	As-drawn	3	1.60 to 2.50	1 570 to 1 870

\*1 N/mm<sup>2</sup> = 1 MN/m<sup>2</sup> = 0.102 0 kgf/mm<sup>2</sup>.

**10.1.1 Number of Tensile Tests** — One tensile test shall be carried out for every 10 coils or part thereof and where the wire is cut into lengths, for every 10 bundles or part thereof.

**10.2 Torsion Test** — The test piece, when subjected to torsion test in accordance with IS : 1717-1971†, shall withstand 10 number of turns in a length equivalent to 100 diameters or width in the case of flat wire. If the test piece is less than 100 diameters or widths, the number of turns shall be proportionally reduced.

**10.2.1 Number of Torsion Tests** — One torsion test shall be carried out for every 10 coils or part thereof and where the wire is cut into lengths, for every 10 bundles or part thereof.

**10.3 Reverse Bend Test** — The test piece, when tested in accordance with IS : 1716-1971‡, shall withstand, without sign of failure, being bent forward and backward three times through 180 degrees over a diameter equal to six times the wire diameter or width, the first bend of 90 degrees not being counted.

\*Methods for tensile testing of steel wire (*first revision*).

†Methods for simple torsion testing of steel wire (*first revision*).

‡Methods for reverse bend testing of steel wire (*first revision*).

**10.3.1** One reverse bend test shall be carried out for every 10 coils or part thereof and where the wire is cut into lengths, for every 10 bundles or part thereof.

**10.4 Straightness Test** — A sample of 675 mm shall roll freely on a perfectly flat surface.

**10.5 Deflection Test** — Both ends of 675 mm sample of wire shall be made to meet each other and then released, the deflection shall not exceed 50 mm.

## **11. RETEST**

**11.1** Should any one of the test pieces first selected fail to pass any of the tests specified in this standard, two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass, the material represented by the test samples shall be deemed to comply with the requirements of that particular test. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be considered as not having complied with this standard.

## **12. RUST PROTECTION**

**12.1** When steel wire for umbrella ribs is supplied without any protective coating, each coil or bundle of wire shall be dipped in a suitable oil for rust prevention during storage.

## **13. PACKING**

**13.1** Unless otherwise specified by the purchaser, steel wire for umbrella ribs shall be supplied in coils and wrapped with gunny bags.

## **14. MARKING**

**14.1** Each coil or bundle of wire shall be bound and fastened compactly and shall have a tag legibly marked with the size, length and mass of the wires and also the name or trade-mark of the manufacturer.

**14.1.1** The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

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- 279-1972 Galvanized steel wire for telegraph and telephone purposes (*second revision*)
- 280-1972 Mild steel wire for general engineering purposes (*second revision*)
- 1673-1973 Mild steel wire for the manufacture of machine screws ( by cold heading process ) (*first revision*)
- 1812-1973 Carbon steel wire for the manufacture of wood screws (*first revision*)
- 1835-1972 Steel wire for ropes (*second revision*)
- 2255-1969 Mild steel wire rod for the manufacture of machine screws ( by cold heading process ) (*first revision*)
- 2589-1975 Hard drawn steel wire for upholstery springs (*first revision*)
- 3835-1966 Aluminized steel core wire for aluminium conductors ( ACSR )
- 4223-1975 Steel wire for umbrella ribs (*first revision*)
- 4224-1972 Steel wire for staples, pins and clips (*first revision*)
- 4824-1973 Bead wire for tyres (*first revision*)
- 5239-1969 Wire rod for the manufacture of aluminized steel core wire for aluminium conductors
- 5993-1970 Aluminized steel wire for telegraph and telephone purposes
- 6902-1973 Steel wire for spokes
- 7557-1974 Steel wire ( up to 20 mm dia ) for the manufacture of cold forged rivets
- 7887-1975 Mild steel wire rods for general engineering purposes
- 7904-1975 Carbon steel wire rods

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